# BOTANICAL GAZETTE.

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A VISIT TO THE SHELL ISLANDS OF FLORIDA, by A. H. Curtiss.—Paper I.—On the eastern coast of Florida there are extensive grassy marshes stretching from the Everglades northward, with more or less interruption, to Georgia. These are separated from the ocean by islands and by long sand-bars connecting with the mainland. The St. John's river is bordered with these marshes for several miles from its mouth. Through them and between the sea-islands and main land of Georgia travelers reach Florida by the "inland passage." This passage enters the river within sight of its mouth and between a group of islands called "The Sisters." These islands, like many others of smaller size which are scattered through the marshes, are composed entirely of oyster shells. Though the same species of mollusk now abounds in these waters, it is difficult to imagine what agency led to their accumulation into such vast mounds, rising abruptly from the marshes to a height of from five to twenty feet and sometimes covering a square mile in area. The Sisters are three in number, about equidistant, similar in size and readily suggest the name they bear. The appearance of these islands, their large size and apparent inaccessibility, the luxuriant vegetation covering a seemingly impenetrable soil, naturally excite the curiosity of passing tourists, but it is evident that their botanical features were unknown previous to 1878, during which year the writer made frequent visits to them, and found them to be as marked in botanical as in geological features and as regards entomology, incomparable. It is a unique region, a land flowing with honey and gall, in which one may enjoy much and suffer much. With this, a foretaste, we invite the reader to accompany us mentally (the more comfortable way) on a tour of inspection.

Sailing down the lake-like St. John's till we emerge from the treacherous waters of the "middle-marsh" we behold on our right the bold promontory called St. John's Bluff, rich in historical associations and in growths of *Ceratiola* and *Ximenia*, vast marshes to the left, and far ahead the dim shaggy outlines of the Sisters. A favoring breeze speeds us toward them; one by one the intervening miles are counted out, and presently we are skirting the outlying marshes of the largest, called Pine-Island. The banks in places are firm and brist-

ling with oysters, in others broken down and submerged by recent storms. Creeks cut them at intervals, leading, no one knows where. One inlet in particular, our boatman calls the "Mouth of Hanamile," which leads to the "Pepper Islands." Through the Mouth and down the throat of the passage we go, and soon reach the retreat of the fiery *Capsicum*. The banks are steep and composed wholly of bleached oyster shells which slip under our feet and throw us against the points of the "Spanish Bayonet," *Yucca aloifolia*, which almost entirely covers the island. Bleeding from its punctures we scale the parapet and look around. Bayonets bristle and interlock on every hand. There are shrubby growths of *Sageretia*, *Forestiera porulosa* and *Quercus virens*, with rigid spine-like branches and bloated Opuntias warning us to touch not. Climbing over these formidable plants and binding them together, is found that singular vine, the *Vincetoxicum scoparium*, Gray. Its tough, twine-like, green and almost leafless stems intertwine among neighboring plants like a *Cuscuta*. A dozen or more of these stems often twist together into a rope, run over to another branch or bush and separate again. If one cuts his way through the tangle each severed end reminds him that he is dealing with a member of the milk-weed family. It bears a profusion of minute yellowish flowers and the pods are as slender as the branches. The sister species, *V. palustre*, Gray, grows in saline marshes, twining in long spirals up the terete leaves of *Juncus* and *Fimbristylis*. The slender, half-shrubby *Capsicum frutescens* grows here in abundance, finding support for its straggling branches among shrubs of stouter growth. It closely resembles the southern, shrubby growth of *Solanum nigrum* except in fruit, which is red and apparently the same as the "Bird-pepper" sold by druggists. The fruit ripens throughout the year and birds gather it. The *Forestiera*, like its cousin *Chionanthes*, is a slender tree with similar fruit but inconspicuous flowers and meager foliage. Perceiving a clump of these trees laden at the top with ripe fruit we decide to climb for it, although the heat is intense. After much cutting of tangled vines and Bayonet points we reach the sought for fruit and find that the heat has so blistered it that the blue pulp has almost entirely disappeared, leaving the stones clean and yet firmly attached to their peduncles.

Leaving this inhospitable isle, a short sail brings us to 'Possum Island. Like the one just visited it is composed entirely of shells, but the vegetation is quite different. The characteristic plants of this are not boldly repellant as in the other, but of a deceptive, treacherous nature, armed with worse but partially concealed weap-

ons. I doubt if such an assemblage of execrable plants is to be found in so small a space elsewhere in the whole world. Hidden among the grass is the *Opuntia Pes-Corvi*, its slender, creeping joints armed with long, sharp spines, which inflict a most painful wound, the barbed points holding on so tenaciously that the joints of the cactus break off with them. It is a plant not to be handled with impunity—much less to be sat upon. Of the large *Opuntia vulgaris* there is also an abundance. It is armed with fascicles of minute, stinging spines which seem to have a much stronger attachment for ones hand than for the parent plant. Here are also barricades of Spanish Bayonets, tangles of spring vines, beds of Spanish needles and stinging nettles. But worst of all is the *Mentzelia Floridana* or "Poor Man's Plaster." It is as handsome as a primrose and as incapable of giving pain, yet one soon comes to dread it more than the *Yucca* or *Opuntia*. It is a weak, diffusely branching plant, reclining on the ground and on other plants, and adorned with bright yellow flowers similar to those of a cactus. Its leaves are extremely pretty and change as they fade to various shades of yellow and brown. A weary, unwary tourist is tempted to recline upon the soft mats of herbage it spreads so invitingly, but woe to him if he yields to the temptation, for upon rising he finds himself clothed like Joseph in a coat of many colors, gorgeous with patches of yellow, orange, russet and every shade of green. Each leaf that touches him has stuck like an adhesive plaster and is not to be removed by pulling or scraping. The whole plant is covered with a pubescence consisting of minute, white, barbed, siliceous hairs, and as the leaves are very tender it is almost impossible to detach them from a woven fabric.

The resources of this islet are soon exhausted, and the excessive heat constrains us to betake ourselves to the water again. There is no shade and the shells seem to give out as much heat as the sun itself, producing a temperature of fully 150 degrees. Once again floating between walls of living green, thoughts of sunstroke are supplanted by anticipations of rest and pleasure within the inviting groves of Pine-Island to which we now draw near. Our journey has been thus far a purgatorial passage to—perhaps—a botanical paradise. We shall soon know if our boatman finds the right channel through the marshes and that before the tide ebbs. (To be continued.)

CARBONIC ACID IN THE AIR OF FORESTS.—The information has come to us that Prof. Ebermayer and Dr. Schwappach find that the air

within an extensive forest contains, in summer, almost double the proportion of carbonic acid in the air over the open country. On the other hand, forest soil is in summer very much poorer in carbonic acid than the soil of the open fields and the amount in the latter rises with elevation of temperature much more rapidly than does that in the former. The diffusion of carbon in the soil seems to be slow, as its quantity appears to vary greatly in places close to each other.

THE PHYLLOTAXIS OF LEAVES, by A. P. Morgan, M. D.—1. The arrangement of leaves upon the stem is denominated *phyllotaxis*. Leaves are arranged upon the stem in three principal ways; (1) they are *alternate*, (2) they are *opposite*, (3) they are *verticillate* or *whorled*. Leaves are alternate upon the stem when but a single leaf grows at each node. Leaves are opposite when two leaves grow at each node upon opposite sides of the stem. The leaves are verticillate or whorled when more than two leaves grow in a circle or whorl around each node of the stem.

I. *Alternate Leaves.*—2. Alternate leaves are arranged upon the stem in a succession of spiral *cycles*. The length of each cycle is determined by the distance from any one leaf to the leaf directly above it upon the stem. The cycle is represented by a fraction of which the numerator denotes the number of times the spiral winds around the stem, and the denominator indicates the number of leaves in the cycle.

3. The various arrangements of alternate leaves are designated in accordance with the numbers of their vertical ranks upon the stem; these are always the same as the number of leaves in the cycles.

4. It has been ascertained that with rare exceptions the cycles in the various arrangements of alternate leaves are represented by the series of fractions;

1-2, 1 3, 2-5, 3-8, 5-13, 8-21, 13-34, &c.

*It is here proposed to amend this series by placing at its beginning* 0-1. In this series the numerator of each fraction after the first two is obtained by adding the numerators of the two preceding fractions, and the denominator is obtained by adding their denominators.

5. The series 0-1, 1-2, 1 3, 2-5, &c, represents the different cycles of arrangement when we follow the shortest path around the stem. If we go around in the opposite direction, by the longest route, the series will be, 1-1, 1-2, 2-3, 3-5, 5-8, 8-13, 13-21, 21-34, &c., in which each fraction is the complement of the corresponding fraction in the preceding series.

6. *The 0-1 Cycle.*—The 0-1 cycle applies only to the simplest of Phænogams, such as *Lemna* and *Wolffia*; there is but one leaf and no spiral. It represents the primeval marchantioid frond, the common ancestor of all Monocotyledons. Probably no plant rising to any height has a stem with *monostichous* or one-ranked leaves.

7. *The 1-2 Cycle.*—In the 1-2 cycle the spiral makes one turn and bears two leaves. The 3d leaf stands directly over the 1st, the 4th over the 2d, etc.; the odd numbers being ranged on one side of the stem and the even numbers on the other. The leaves are *distichous* or two-ranked. Each leaf is 1-2 the circumference of the stem or 180 degrees distant from the preceding leaf. Examples of this mode of arrangement are to be found in the alternate leaves of the Elm and of Grasses.

8. *The 1-3 Cycle.*—In the 1-3 cycle there are three leaves on one turn of the spiral. The 4th leaf stands directly above the 1st, the 5th above the 2d, the 6th above the 3d, etc. The leaves are *tristichous* or three-ranked. Each leaf is at a distance from the preceding leaf equal to 1-3 the circumference of the stem or 120 degrees. The Alder and Sedges furnish examples of tristichous leaves.

9. *The 2-5 Cycle.*—The 2-5 cycle is the most common of leaf arrangements, and may be observed in most Exogenous plants, as the Cherry, Poplar, etc. The 6th leaf stands directly over the 1st, but is not reached until the spiral has wound twice about the stem. Hence the leaves are *pentastichous* or five-ranked. The angular divergence of the leaves is 2-5 the circumference of the stem, or 144 degrees.

10. *The Higher Cycles.*—In the 3-8 cycle, the leaves are eight-ranked and the angular divergence is 135 degrees. In the 5-13 cycle the angular divergence of the leaves is 137 degrees plus a fraction. Hence the series 0-1 1-2, 1-3, 2-5, 3-8, 5-13, 8-21, 13-34, &c., being infinite, it constantly approximates to some mean value lying between 1-2 and 1-3; the successive cycles being alternately larger and smaller than the mean value, and the difference of their angular divergences continually growing less and less. No two leaves of a cycle are ever farther apart than one-half the circumference of the stem or nearer together than one-third of its circumference.

11. Hence it is that in the higher cycles it becomes difficult to trace the spiral arrangement of the leaves, and to distinguish their vertical ranks. For example, the difference between the 5-13 and 8-21 arrangement is only 1-273 of the circumference of the stem, the difference between the 8-21 and 13-34 arrangement is 1-714 of the circumference. It is evident that a very slight irregularity of growth

will render the exact order of superposition uncertain. And cases no doubt occur in which each leaf stands alone in its own vertical rank and the arrangement is what is termed *curviserial*. Such a cycle may be marked $\infty$-$\infty$; the angle of divergence is such that it is not possible to divide the circumference by it, and hence no leaf can be placed exactly above another.

12. Nevertheless, we are enabled to mark the succession of the leaves and thus to determine the order of their arrangement, by means of the *secondary* spirals. In every cycle after the first two, there are one or more orders of parallel secondary spirals. These pursue an oblique direction between the primary generating spiral and the vertical ranks to which it gives rise. If we mark the alternate leaves of any axis in the order of their succession, beginning with the lowest, by the series of natural numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, &c., we may exhibit the primary and secondary spirals and the vertical ranks of the different cycles as follows:

a. The 0-1 cycle. (Fig. 1.) 1 vertical rank, 1, 2, 3, 4, 5, &c.

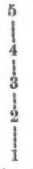

Fig. 1.

b. The 1-2 cycle. (Fig. 2.) 1 spiral of the 1st order, 1, 2, 3, 4, 5, &c.; 2 vertical ranks, 1, 3, 5, 7, 9, &c., and 2, 4, 6, 8, 10, &c.

c. The 1-3 cycle. (Fig. 3.) 1 spiral of the 1st order, 1, 2, 3, 4, 5, &c.; 2 spirals of the 2d order, 1, 3, 5, 7, 9, &c., and 2, 4, 6, 8, 10, &c.; 3 vertical ranks, 1, 4, 7, 10, 13, &c., 2, 5, 8, 11, 14, &c., and 3, 6, 9, 12, 15, &c.

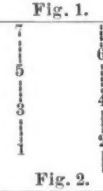

Fig. 2.

d. The 2-5 cycle. (Fig. 4.) 1 spiral of the 1st order, 1, 2, 3, 4, 5, &c.; 2 spirals of the 2d order, 1, 3, 5, 7, 9, &c., and 2, 4, 6, 8, 10, &c.; 3 spirals of the 3d order, 1, 4, 7, 10, 13, &c., 2, 5, 8, 11, 14, &c., and 3, 6, 9, 12, 15, &c.; 5 vertical ranks, 1, 6, 11, 16, 21, &c., 2, 7, 12, 17, 22, &c., 3, 8, 13, 18, 23, &c., 4, 9, 14, 19, 24, &c., and 5, 10, 15, 20, 25, &c.

Fig. 3.

e. The following table exhibits the successive orders of spirals in each cycle as far as the 13-34 cycle. The signs + and – indicate the direction of the spirals to the right or left of the vertical line, as compared with the direction of the primary generating spiral.

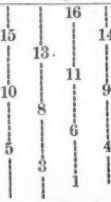

Fig. 4.

13. From a consideration of the origin and de-

TABLE I.

| C | I | II | III | IV | V | VI | VII |
|---|---|---|---|---|---|---|---|
| 0–1 | 0 | | | | | | |
| 1–2 | +1 | | | | | | |
| 1–3 | +1 | −2 | | | | | |
| 2–5 | +1 | −2 | +3 | | | | |
| 3–8 | +1 | −2 | +3 | −5 | | | |
| 5–13 | +1 | −2 | +3 | −5 | +8 | | |
| 8–21 | +1 | −2 | +3 | −5 | +8 | −13 | |
| 13–34 | +1 | −2 | +3 | −5 | +8 | −13 | +21 |

velopment of the spirals in these cycles, we deduce the following two fundamental principles:

I. *Every cycle contains within itself in the form of spirals all the vertical ranks of the preceding cycles.*

II. *The consecutive orders of spirals mount one above another alternately to right and left till finally they reach the vertical ranks.*

14. As consequences of these two principles we may infer as follows:

a. The system begins with 0-1.

b. Every cycle discloses the preceding cycles of the system.

c. The number of spirals in the successive orders is the same as the denominators of the fractions which represent the system.

d. The spirals of the 1st, 3d, 5th, &c., orders have the same oblique direction to the right or to the left. The spirals of the 2d, 4th, 6th, &c., orders have the same oblique direction to the left or to the right, cross-wise of the spirals of the odd orders.

e. The common difference of the numbers in the series which represent any order of spirals is the same as the number of spirals in the order.—[To be continued.]

HELIOPSIS VS. HELIANTHUS.—Probably there are few botanists, especially of the less experienced ones, who are not deceived, at times, in regard to *Heliopsis lævis*, Pers. Even after studying *Heliopsis* and noting its peculiarities, it is still easy to mistake it. Its external appearance is so similar and yet its structure is so different from any *Helianthus* that we wonder how it was possible to be so completely deceived. Were this the case only with myself, it would be nothing remarkable, but I have heard other and more experienced workers speak of the same trouble. It certainly is very exasperating to take considerable pains to obtain neat specimens, lay them carefully in papers, and then find when you reach home that you have collected *Heliopsis* instead of some new *Helianthus*. The polymorphous nature of this species makes it the more difficult to recognize. In the typical form I have found the stem often glaucous and the leaves nearly smooth. The var. *scabra* has the leaves and often the stem

scabrous. This form is the largest. Intermediate between these, there is a small form with smooth stem and scabrous leaves. Of course these all run into each other, so that we may expect anything from a glaucous to a scabrous stem, variously combined with smooth, rough or scabrous leaves. So much for appearance. When we look at the structure of the heads there is little similarity. Compare the two:

| | *Heliopsis.* | *Helianthus.* |
|---|---|---|
| Rays | pistillate | neutral. |
| Receptacle | conical | flat or convex. |
| Chaff | linear-lanceolate | broad, embracing the achenia. |
| Pappus | none | two or four deciduous scales. |

Keeping these points in mind there will be no trouble in recognizing *Heliopsis* at once. In dried specimens I find a peculiarity belonging to this species that does not seem to be possessed by any *Helianthus*. In the former the base of the rays is a deep orange color, shading off to light orange at the top. The back or outside of the ray florets is much lighter than the inside, becoming a straw yellow. These shades seems to be constant and exist in all my specimens, which, considering the universality of the species, are entirely too numerous. I do not find this shading to be present in any of the *Helianthi*. This presents an obvious means of distinguishing between the two and the presence of this coloring should at least lead us to suspect the identity of the species in question.—C. R. BARNES, *Madison, Ind.*

CROSS-FERTILIZATION IN LOBELIA SYPHILITICA.—In an article upon "Certain Contrivances for Cross-Fertilization in Flowers," published in the American Naturalist for January, Prof. J. E. Todd gives the following very interesting account of the arrangements for the cross-fertilization of *Lobelia syphilitica*, L.

The corolla is monopetalous and two lipped, the lower lip consisting of three petals and the upper of two. Between the latter is a slit extending to the base of the tube. The five stamens are free from the corolla and united, their anthers and upper parts of the filaments forming a tube; or it may be said, the anthers combining, form a common cell for the pollen, which opens by a pore at its apex. On the lower margin of the pore are many short, stiff hairs, which at first project across the pore closing it, but when the pollen is ripe they turn abruptly downwards and leave it open. There is only one pistil, which is armed near the end of the style with a collar of short stiff hairs, similar in size and character to those on the anthers just

mentioned. The end of the style with its hairs forms the bottom of the pollen-cell before described. We have, therefore, the stigma shut up with the pollen in the same cell. "A capital arrangement for *self*-fertilization," one says. Nay, not too fast! The stigma is composed of two fleshy lobes, its receiving surface being on their inner surface And they are firmly closed together, so that the end of the pistil looks like a closed mouth with its lips firmly pressed together. With its bristly collar it reminds one of Jack-in-a-box, with an unusually "stiff upper lip."

This combined pistil and stamens is S-shaped, and when the flower opens, it springs through the slit of the corolla and stands with the tip of the pollen-cell just behind the upper lip of the corolla. Sometimes there is no trace of the stamens seen from the front; but if an insect tries to enter, the slit between the petals opens, the hairs of the anthers strike his back, and as he forces his way in, they produce a jarring of the pollen-cell which freely sprinkles the pollen upon him.

As the pollen escapes it is kept up to the pore by the pressure caused by the gradual lengthening of the style. The hairy collar acting like a swab, sweeps the cell clean. When all the pollen is gone, the style, continuing its growth, pushes the stigma through the pore and forward through between the upper petals. The end of the style then comes downward, the lips of the stigma open and roll back as though turning inside out. This exposes the whole surface of the stigma to be covered with pollen from the back of the first insect which comes from a flower discharging pollen. So the cross-fertilization is beautifully accomplished.

Fungoid Friends and Foes.—In the twenty-ninth annual report of the Regents of the University of the State of New York on the New York State Museum of Natural History, the report of the Botanist, Chas. H. Peck, contains the following interesting facts:

Nearly three hundred species of fungi that attack and inhabit living plants have been detected in the State (New York).

They affect almost as many species of flowering plants. In some cases several parasites attack the same host plant; in others, one parasite attacks two or more host plants indiscriminately. But, in many instances, a single parasite is peculiar to a single supporting plant, in which cases the latter may be taken by the student as a guide in his search for a description of the former. A Puccinia found on the leaves of the dwarf cornel, *Cornus Canadensis*, is almost certain to

answer to the description of *Puccinia porphyrogenita*, and an Æcidium on the leaves of the barberry, *Berberis vulgaris*, will scarcely be any other than *Æcidium Berberidis*.

A fact of still greater moment is, that some of our cultivated plants are attacked by fungoid foes which, minute as they are, materially diminish their vigor, impair their useful products and, in some instances, even destroy their vitality. Raspberries are attacked by the American raspberry rust, *Uredo luminata;* pea vines, by the pea mildew, *Erysiphe Martii;* oats and wheat, by the grain smut, *Ustilago Carbo;* plum and cherry-trees, by the black-knot, *Sphæria morbosa;* and lettuce and onions by their respective molds, *Peronospora gangliformis* and *Peronospora Schleideniana*. Such fungi must be regarded as injurious to the interests of the husbandman, nor is the pecuniary loss which they occasion trivial or inconsiderable. The loss produced by the potato mold alone, *Peronospora infestans*, abundantly warrants all the effort and study that have been devoted to the investigation of the history of the fungus and to the discovery of some efficient means for preventing its attacks or overcoming their destructive consequences.

On the other hand those fungi that infest noxious weeds and hinder their dissemination and multiplication, must be regarded as the friends and allies of man. Thus the thistle rust, *Trichobasis suaveolens*, an early state of *Puccinia Compositarum*, sometimes attacks the Canada thistle with great virulence, and so impairs its vigor as to prevent the development of the seeds, thereby checking the propagation and spread of this pestilent plant. So, also, the troublesome bur-grass, *Cenchrus tribuloides*, is sometimes infested by a smut fungus, *Ustilago Syntherismæ*, which not only prevents the development of the seeds of the grass but also of the annoying bur-like involucres. It may yet be found practicable to keep down this grass by the artificial dissemination of the spores of its parasitic fungus in those light sandy soils where the grass usually abounds. It certainly is desirable that the life histories of these fungoid friends and foes should be better understood than they now are, and that the means of multiplying or diminishing their numbers according to their characters should be under the control of the farmer.

New Species of Fungi, by Chas. H. Peck.—The eight species of fungi here described were collected by Mr. T. S. Brandegee and communicated to me by Mr. E. A. Rau. The quotations are from the notes of Mr. Brandegee.

PUCCINIA GRINDELIÆ.—Spots pale, orbicular, one to three lines in diameter, sometimes confluent; sori amphigenous, minute, crowded, black or blackish-brown; spores variable, oblong, obtuse or obtusely pointed, strongly constricted at the septum, .0016–.002 of an inch long, .0008–.001 broad; pedicel hyaline, equal to or exceeding the spore in length.

Radical leaves of *Grindelia squarrosa*. Colorado. "Not common." The variability of the spores is quite noticeable. In some the septum is wanting, in others the pedicel is attached to the side of the basal cell, a peculiarity sometimes seen in the spores of *P. variabilis*.

PUCCINIA CLADOPHILA.—Sori numerous, cauline, orbicular elliptical or oblong, sometimes confluent, surrounded by the ruptured epidermis, blackish-brown; spores subelliptical, scarcely constricted, obtuse, .0012–.0015 of an inch long, .0008–.0009 broad; pedicel very short.

Stems of *Stephanomeria minor*. Colorado. "On but one individual, although the plants are common." The branches sent were abundantly infested with the fungus. No leaves accompanied the specimens, so that I am unable to say whether they are ever attacked or not.

UROMYCES PLUMBARIUS.—Sori amphigenous, scattered or subconfluent, at first covered by the epidermis and of a peculiar shining leaden hue, at length exposed and of a dark ferruginous-brown or blackish-brown color; spores obovate or subelliptical, obtuse or rarely very bluntly pointed, .0009–.0012 of an inch long, about .0008 of an inch broad; pedicel very short or obsolete.

Leaves of *Œnothera cæspitosa*. Colorado. "Not common." The beautiful metallic hue of the covering epidermis is suggestive of the specific name.

UROMYCES BRANDEGEI.—Spots none; sori scattered, rarely slightly confluent, prominent, orbicular elliptical or oblong, black; spores subglobose or broadly elliptical, rough with minute warts or papillæ, .0012–.0016 of an inch long, .0011–.0015 broad; pedicel hyaline, usually equal to or exceeding the spore in length.

Leaves of *Bouteloua curtipendula*. Colorado. "Common." This is a fine species, very distinct from *U. Graminum*. It is with pleasure that I dedicate it to its discoverer.

UROMYCES SIMULANS.—Sori epiphyllous, varying from subrotund to linear, often crowded and subconfluent, ferruginous-brown; spores variable, subglobose, obovate or elliptical, rather large, minutely rough, .0013–.0016 of an inch long, .001–.0011 broad; pedicel about equal to or shorter than the spore in length, easily separating from it.

Sheaths and upper surface of leaves of *Vilfa*. Colorado. In the character of the sori this species resembles *Puccinia Graminis*, from which, however, it differs in its paler ferruginous-brown color. The mature spores easily separate from the pedicels, in which respect the fungus simulates species of *Trichobasis*.

UROMYCES SANGUINEUS.—Spots small, scattered, sometimes confluent, bright-red or purplish-red; sori scattered, one on each spot, prominent, cinnamon-brown, often partly concealed by a single large fragment of the ruptured epidermis; spores obovate or oblong-pyriform, .001–.0016 of an inch long, .00065–.0008 broad, generally uninucleate, easily separating from the pedicel; pedicel hyaline, equal to or less than the spore in length.

Leaves of *Berberis Aquifolium*. Colorado. The deciduous pedicels connect this species with the genus *Trichobasis*, but I find an occasional one that is persistent, which, with the *Uromyces*-like appearance of the spores, induces me to refer the species to the genus *Uromyces*.

CRONARTIUM COMANDRÆ.—Peridium elongated, subcylindrical, more or less curved, slightly swollen at the base, yellowish or bright orange; spores subglobose, .0003–.0004 of an inch in diameter.

Stems of *Comandra pallida*. Colorado. A paler form of what appears to be the same species occurs on the leaves of *Comandra umbellata*, but I have not seen it fertile. The fungus surrounds the stems on all sides with its bright-colored bristling peridia.

ÆCIDIUM GRACILENS.—Spots thickened, green or slightly discolored; peridia hypophyllous, elongated, slender, pink or rosy-red, white when evacuated; spores globose, bright-orange, .0009–.001 of an inch in diameter, with a thick hyaline epispore.

Leaves of *Philadelphus microphyllus* Colorado. "Not common." The pinkish hue of the peridia when filled with spores is very beautiful.

SOME MISSOURI FERNS.—I have found *Asplenium parvulum* growing abundantly along the cliffs of the James River in this county (Greene), also *Adiantum Capillus-Veneris* in the same locality.—E. M. SHEPARD, *Springfield, Mo*